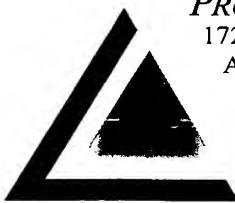# LACASSE & ASSOCIATES, LLC

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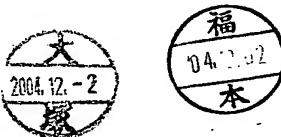Terry L. Lacasse

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November 29, 2004

**Via Federal Express**
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Kanagawa, Japan 244-0817

RE: PATENTABILITY SEARCH FOR STORAGE SYSTEM AND FILE
             REFERENCE METHOD OF REMOTE SITE STORAGE SYSTEM
Your File: 340301086US01
Our Docket: PSP-1042013

Dear Mr. Otsuka:

In accordance with your request, we have conducted a patentability search on the above-identified subject matter.

Enclosed with this report are copies of the search results and your disclosure materials. If after reviewing the results, you feel that the search feature (or specific search elements), the field of search, or results are not commensurate with your original request, or you would like to extend the search into additional areas, please contact us.

Sincerely,
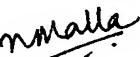
Nidhi Malla

Enclosures
NM:TT:dcw
s04/psp1042013

CONFIDENTIAL
(Patentability Search)

I.   SEARCH FEATURE

A.   General

Remote copy

B.   Specific

A disk-control unit at a remote site receives file data written in accordance with update of a file in a storage system at a local site and a history of file-management information from the storage system at the local site through a communication link, and stores the data and the history on a disk of the storage system. The file-system processing unit refers to the history of the file-management information on the disk and updates the file-management information in the file-system cache in accordance with the update of the file in the storage system at the local site. Further, when a client connected or coupled to the storage system makes a read request, the file system processing unit refers to the file-management information updated in the file system cache and transfers contents of the update of the file to the client.

C.   Application

Transferring contents of updates made at local site to remote site

II.   FIELD OF SEARCH

The search of the above features was conducted in the following areas:

A.   Classification search

Class	Subclasses	Description
707/		**DATA PROCESSING: DATABASE AND FILE MANAGEMENT OR DATA STRUCTURES**
	1	DATABASE OR FILE ACCESSING
	200	FILE OR DATABASE MAINTENANCE
	204	..Archiving or backup
711/		**ELECTRICAL COMPUTERS AND DIGITAL PROCESSING SYSTEMS: MEMORY**
	147	.Shared memory area
	154	.Control technique

Class	Subclasses	Description (continued)
	161	..Archiving
	162	...Backup

The above subclasses represent areas deemed to contain subject matter of interest to one or more of the search features. Please note that relevant references may be classified outside of these areas. The integrity of the search is based on the records as presented to us by the United States Patent and Trademark Office (USPTO). No further integrity studies were performed. Also a key word search was performed on the USPTO full-text database including published U.S. patent applications.

III. **RESULTS OF SEARCH**

A. References developed as a result of search:

U.S. Patent No.	Inventor
5,592,618	Micka et al.

U.S. Patent Application Publication No.	Inventor
2003/0158869 A1	Micka
2003/0229764 A1*	Ohno et al.
2004/0172509 A1*	Takeda et al.
2004/0193952 A1	Narayanan et al.

*References assigned to Hitachi, Ltd.

B. Discussion of related references in numerical order:

The patent to Micka et al. (5,592,618), assigned to Intl. Business Machines Corp., provides for a *Remote Copy of Secondary Data Copy Validation-Audit Function*. Disclosed is a primary host **1200** and a secondary host **1210**. The primary data updates are continuously shadowed at a secondary site (secondary host **1210**). The secondary site asynchronously shadows in real time. A primary data mover **404** collects sets of record updates and creates self describing record sets. The self describing record sets are transmitted to the secondary site, wherein the self describing record sets provide information adequate for the secondary site to shadow the record updates (without further communications from the primary site).

The patent application to Micka (2003/0158869 A1), assigned to Intl. Business Machines Corp., provides for an *Incremental Update Control for*

Remote Copy. Disclosed is an application host **102** asynchronously transmitting one or more incremental database updates from a primary volume at a primary site **101** to a remote volume at a remote site **103**. The remote volume (at the remote site) is synchronized with the primary volume for the current database update by transmitting a modified data to the remote volume as indicated by one or more bits in a second bitmap (see figures 1, 5; and paragraphs 2, 5, 6, 13, 22, and 25-26).

The patent application to Ohno et al. (2003/0229764 A1), assigned to Hitachi, Ltd., provides for *Data Storage Subsystem*. Disclosed in a synchronous transfer mode is a channel adapter **22** of a second subsystem **11b** updating each target cache entry **31** in a cache memory as updated data **32** (see figures 1-2, 4; and paragraphs 4, 18, 40, 53, and 55).

The patent application to Takeda et al. (2004/0172509 A1), assigned to Hitachi, Ltd., provides for a *Data Processing System Including Storage Systems*. Disclosed is a primary disk array device transferring a journal (updating history) to a secondary disk array device **200B** according to instructions of the primary **100A** and secondary **200B** updates the data stored in the secondary disk array device **200B** by using the journal according to instructions of the secondary host **100B**. A secondary journal volume has a metadata area **7100** and a journal data area **7200**. The metadata **7110B** is copied from a metadata area of a primary journal volume **2222A** and is stored in the metadata **7100** (of secondary journal volume). The update of PVOL **2212** can be reflected in SVOL **2214** (see figures 1, 3-4, 7-17; and paragraphs 14, 38, 42, 84, and 86-88).

The patent application to Narayanan et al. (2004/0193952 A1) provides for *Consistency Unit Replication in Application Defined Systems*. Disclosed is a consistency unit **105** for updating periodically a source replica **104** to a destination replica **106**. The updates are synchronized to the destination replica **106**. The metadata of a changed data of the source replica **104** is utilized to generate the consistency unit **105** of metadata of the changed data. The consistency unit **103** includes all of the related parent and child metadata tables of the changed records in a data collection of a first destination selected for synchronization (see figures 1-2; and paragraphs 46-49, and 51-53).

Thien Tran